

Application No. 10/716,724
Amendment and Response dated October 4, 2005
Reply to Office Action of September 21, 2005

Listing of Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-2 (canceled)

3. (previously presented) A method of printing on a substrate comprising the steps of:

moving a print head carriage, having at least one ink jet nozzle thereon, parallel to a plane in which is supported a substrate having a surface that may be at any of a plurality of locations relative to the plane;

sensing the position of the surface of the substrate relative to the carriage; and

adjusting of the distance from the nozzle to the plane in response to said sensing to position the nozzle at a predetermined distance from the surface of the substrate where ink is to be jetted from the nozzle;

jetting ink from the nozzle across the predetermined distance onto the surface of a substrate.

4. (previously presented) The method of claim 3 wherein:

the sensing of the position is carried out while moving the print head carriage; and

the adjusting includes varying the position of the nozzle relative to the plane as the print head carriage moves so as to maintain the predetermined distance across the substrate in response to the sensed distance.

Claim 5 (canceled)

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6. (previously presented) A method of printing on rigid panels comprising the steps of:

moving parallel to a rigid panel a print head carriage having an ink jet nozzle thereon directed toward a surface of the panel;

automatically adjusting the distance of the nozzle from the panel to maintain a predetermined distance between the nozzle and the surface of the panel at the location onto which ink is to be jetted from the nozzle;

while moving the print head carriage, jetting ink from the nozzle across the predetermined distance and onto the surface of the rigid panel;

the surface of the panel onto which the ink is jetted varying across the panel in its distance from the carriage; and

the adjusting including varying the position of the nozzle relative to the panel as the print head is moved to maintain the predetermined spacing between the nozzle and the location on the surface at which the ink is jetted.

7. (original) The method of claim 6 further comprising the step of:

sensing the distance between the print head carriage and locations on the surface at which ink is to be jetted; and

varying the position of the nozzle relative to the print head carriage in response to the sensed distance.

8. (original) The method of claim 6 further comprising the step of:

sensing the contour of the surface of the panel; and

moving the carriage parallel to the panel to locations determined in response to the sensed contour and jetting the ink onto the surface of the panel at said locations.

Claims 9-14 (canceled)

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15.(previously presented) A system for printing images on a substrate, comprising:
a multiplicity of print heads mounted in a carriage, the print heads being positioned a distance from the substrate;
a sensor which detects the position of the surface of the substrate; and
a control system which receives the information detected by the sensor and transmits signals to a motor coupled to the carriage, the transmitted signals instructing the motor to adjust the position of the print heads to maintain a desired gap between the print heads and the substrate; and
the control system including a controller which transmits the signals to the motor.

Claim 16. (canceled)

17. (previously presented) The system of claim 15 wherein the controller is coupled to a CPU which receives information detected by the sensor, processes the information, and transmits signals to the controller to instruct the motor to adjust the position of the print heads to maintain the desired gap.

18. (previously presented) The system of claim 15 wherein the control system includes a feedback device which senses the gap between the print heads and the substrate, the gap information being relayed to the controller such that the controller can further instruct the motor to alter the position of the print heads relative to the substrate to achieve the desired gap.

19. (previously presented) The system of claim 18, wherein the feedback device transmits the gap information to a CPU which processes the information and relays the processed gap information to the controller.

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20. (original) The system of claim 15 wherein the motor is a servo motor.

Claims 21-23 (canceled)

24. (original) The system of claim 15 wherein the sensor includes an indicator roller.

Claim 25. (canceled)

26.(currently amended) The system of any of claims ~~15 through 20~~ 15 or 17 through 20 further comprising a table adapted to support the substrate, including flexible and non-flexible substrates.

27.(previously presented) The system of claim 26, wherein the sensor detects the position of the surface of the substrate as the substrate moves through the system.

28. (currently amended) The system of any of claims ~~15 through 20~~ 15 or 17 through 20 wherein the sensor detects the position of the surface of the substrate as the substrate moves through the system.

Claims 29-30 (canceled)

31. (original) The system of claim 15, wherein the sensor is mounted in the carriage.

32. (original) The system of claim 15, wherein the sensor includes two sensors mounted in the carriage.

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33. (original) The system of claim 15, wherein:

the print heads are bidirectional print heads that print while moving transversely across a substrate that is moveable longitudinally relative to the print heads,

the sensor includes two sensors mounted in the carriage transversely of the print heads, one on each side of the print heads.

34.(previously presented) A method for controlling the distance between print heads of a printing system and a substrate, comprising:

moving the substrate relative to the print heads;

detecting the position of the surface of the substrate while the substrate moves relative to the print heads;

transmitting information of the position of the surface of the substrate to a controller;

transmitting height adjustment information signals from the controller to a motor coupled to a carriage which holds the print heads; and

adjusting the position of the print heads with the motor to maintain a desired gap between the print heads and the substrate;

the signals instructing the motor to adjust the position of the print heads to maintain the desired gap between the print heads and the substrate.

35.(previously presented) The method of claim 34, wherein the detecting of the position of the surface of the substrate includes detecting the distance between the print heads and the substrate.

36. (original) The method of claim 35, further comprising transmitting the distance information to the controller and re-adjusting the position of the print heads based on the distance information detected.

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Claim 37. (canceled)

38. (previously presented) The method of any of claims 34 through 36 further comprising:

positioning a substrate on a table adapted to support flexible and non-flexible substrates.

Claims 39-40 (canceled)

41. (original) The method of claim 34, wherein:

the moving of the substrate includes moving the substrate longitudinally relative to the printheads;

the method further comprises moving the print heads transversely on a carriage relative to the substrate; and

the transmitting of the thickness information includes transmitting the information from a sensor on the carriage.

42. (original) The method of claim 41 wherein:

the transmitting of the thickness information includes transmitting the information from at least one of at least two sensors mounted on the carriage.

Claims 43-49 (canceled)

50. (previously presented) The system of claim 15 wherein:

the signals instruct the motor to adjust the position of the print heads by adjusting the position of the carriage relative to the substrate to maintain the desired gap between the print heads and the substrate.

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51. (previously presented) The system of claim 15 wherein:
the signals instruct the motor to adjust the position of the print heads by adjusting
the position of the print heads relative to the carriage to maintain the desired gap
between the print heads and the substrate.

52. (previously presented) The method of claim 34, wherein:
the signals instruct the motor to adjust the position of the print heads by adjusting
the position of the carriage relative to the substrate to maintain the desired gap between
the print heads and the substrate.

53. (previously presented) The method of claim 34, wherein:
the signals instruct the motor to adjust the position of the print heads by adjusting
the position of the print heads relative to the carriage to maintain the desired gap
between the print heads and the substrate.